

SPRAY NOZZLE CLEANER

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates generally to apparatus for spraying liquids and more particularly to power washers having multiple nozzles alternatively usable to control spray configuration.

Description of Related Art

[0002] Power washers are commonly used to spray water at a high pressure to facilitate the cleaning of certain surfaces. These surfaces may include concrete sidewalks and driveways, house and building exteriors, cars and equipment, for example. Chemicals can be commingled with the water to facilitate cleaning. For example, cleaning of delicate surfaces can be facilitated with the addition of soap, and degreasers can be added to facilitate the cleaning of equipment.

[0003] Power washers commonly include an engine or motor which is used to drive a pump. Water is input to the pump typically at a relatively low city water pressure, and output from the pump at a relatively higher pressure. Portability of these systems is facilitated by use of an engine rather than a motor, and by mounting the engine and the pump on a wheeled cart. An elongate high-pressure hose is connected to the output of the pump and communicates the water under pressure to a distal end where the hose is coupled to a wand operable by a user.

[0004] The wand will typically include an elongate tube having a proximal end and a distal end. At the proximal end, the wand includes a handle and valve assembly which is connected to the distal end of the hose. At the distal end of the tube, the wand will typically have a nozzle which controls the configuration of the spray. In order to provide a variety of spray configurations, multiple nozzles are often provided for the user. These nozzles are alternatively attachable to and removable from the distal end of the wand. Screw attachments are common but a quick release system is particular advantageous. This quick release system

typically includes a female connector permanently attached to the distal end of the wand, and multiple male couplings each attach to an associated nozzle.

[0005] For a given application, there may be as many as six or seven nozzles specifically adapted to produce different spray configurations. With all these nozzles available, it is particularly desirable to have them readily available to the user. In the past, the multiple nozzles have been carried on the cart with the engine and pump. In order for a user to change nozzles on the wand, it has been necessary to return to the cart typically with the wand in hand in order to change the nozzle in use. This procedure is complicated by objects which are disposed near the surface being cleaned. For example, in cleaning a concrete patio, the user is commonly around automatic sprinklers which extend above the surface of the patio. In an attempt to return to the area of the cart and thereby facilitate nozzle exchange, the pressure hose can easily become entangled in such objects thereby complicating the process and increasing the time and aggravation associated with nozzle exchange. As an alternative, users have tended to collect the nozzles in a pants or shirt pocket. In order to facilitate a nozzle exchange, all of the nozzles must be removed in order to find the particular nozzle desired. This has also been a cumbersome approach to nozzle exchange but at least has avoided the problems associated with returning to the cart.

SUMMARY OF THE INVENTION

[0006] These deficiencies of the past are overcome with the present invention which includes a nozzle retainer adapted to be disposed at the distal end of a delivery system when it is easily accessible to a user. In a delivery system including a flexible hose and a wand, the retainer can be disposed in proximity to a handle of the wand which is held by the user.

[0007] The retainer typically includes a base plate having a plurality of circumferential holes each of which is adapted to receive a rubber grommet. Nozzles typically formed of a cylindrical coupling and an annular recess are removably held within the grommets. An annular recess commonly associated with the nozzles readily aligns with the plane of the base plate to facilitate gripping and removal of the nozzles from the base plate.

[0008] In a delivery system consisting of a hose, handle and spray tube, the retainer can be disposed in the fluid flow path between the spray tube and handle or the handle and hose.

Alternatively, a rotatable version of the retainer can be attached to the spray tube in proximity to the handle. A nozzle cleaner can be provided with the size and configuration of the nozzles on the retainer.

[0009] In one aspect of the invention, a fluid spray apparatus includes a pump providing a source of fluid at an elevated pressure, and a delivery system having an elongate configuration with a proximal end coupled to the pump. A distal end of the delivery system expels the fluid in a predetermined spray pattern. A nozzle receiver can be included in the delivery system along with a plurality of nozzles each adapted to couple to the receiver and provide an associated spray pattern. A nozzle retainer is attached to the delivery system and adapted to releasably retain the nozzles in proximity to the distal end of the delivery system.

[0010] In another aspect of the invention, a flexible hose is included in the delivery system with a proximal end and a distal end, the proximal end being coupled to the pump. A wand included in the delivery system includes a handle coupled to the distal end of the hose and an elongate tube is attached to the handle for expelling the fluid in a predetermined pattern. This pattern is controlled by one of a plurality of nozzles each of which is adapted to provide the spray with a different pattern. These nozzles can be releasably retained by a retainer disposed in proximity to the handle.

[0011] In a further aspect a method for changing the spray pattern of a fluid spray apparatus comprises the steps of introducing a fluid under pressure into a proximal end of an elongate delivery system. This fluid is then expelled under pressure from the distal end of the delivery system in a spray having a predetermined pattern. A plurality of nozzles are provided each having properties coupled to the distal end of the delivery system to provide the spray with a different associated pattern. The nozzles are retained when not in use in an ordered pattern by the retainer which is disposed in proximity to the distal end of the delivery system. Removing a predetermined nozzle from the retainer enables a user to mount the nozzle on the distal end of the delivery system to provide the spray with the desired configuration.

[0012] In a further aspect of the invention a combination includes a nozzle with a spray orifice and a cylindrical coupler sized and configured to be held in a receiver. A nozzle cleaner having a cleaning pin also includes a cylindrical coupler having generally the same size and

shape of the coupler of the nozzle. A nozzle retainer has a hole that is sized and configured to receive the coupler of the nozzle and the coupler of the nozzle cleaner.

[0013] The nozzle cleaner includes a carrier, a pin having a fixed relationship with the carrier and a guard pivotally mounted relative to the carrier. The guard is adapted to move between a first position wherein the guard covers the pin and a second position wherein the guard is removed to expose the pin for cleaning the orifice of a nozzle.

[0014] These and other features and advantages of the invention will be better understood with reference to preferred embodiments of the invention and reference to the associated drawings.

DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a perspective view showing a fluid spray apparatus including a delivery system with a flexible hose and a wand;

[0016] FIG. 2 is a side elevation view of the wand illustrated in FIG. 1 and showing a preferred embodiment with a nozzle retainer disposed between a spray tube and a handle of the wand;

[0017] FIG. 3 is an elevation view taken along lines 3 – 3 of FIG. 2;

[0018] FIG. 4 is an axially cross-section view taken along lines 4 – 4 of FIG. 3;

[0019] FIG. 5 is a cross-section view showing the retainer prior to insertion of a nozzle;

[0020] FIG. 6 is a side elevation view similar to FIG. 5 showing the retainer with nozzle inserted;

[0021] FIG. 7 is a top plan view taken along lines 7 – 7 of FIG. 2;

[0022] FIG. 8 is a side elevation view of a further embodiment wherein the nozzle retainer is disposed between the handle of the wand and the flexible hose;

- [0023] FIG. 9 is a top plan view taken along lines 9 – 9 of FIG. 8;
- [0024] FIG. 10 is a side elevation view of a further embodiment wherein the nozzle retainer is pivotally mounted on a spray tube of the wand;
- [0025] FIG. 11 is a top plan view of the retainer taken along lines 11 – 11 of FIG. 10;
- [0026] FIG. 12 is a side elevation view of the finger guard associated with the wand of the handle wherein the nozzles are aligned on the finger guard;
- [0027] FIG. 13 is a axial cross-section view of a nozzle cleaner with a dome disposed in a closed position to cover a cleaning pin; and
- [0028] FIG. 14 is an axial cross-section view similar to FIG. 13 and showing the dome in an open configuration to expose the cleaning pin.

**DESCRIPTION OF THE PREFERRED EMBODIMENTS AND
BEST MODE OF THE INVENTION**

- [0029] A fluid spray apparatus or power washer is illustrated in Figure 1 and designated by the reference numeral 10. In this case, the apparatus 10 includes a pump 12 receiving water for example from a garden hose 14. An engine coupled to the pump 12 is carried on a portable cart 16 to facilitate portability of the apparatus 10. A delivery system 18 has an elongate configuration and includes a proximal end 21 and distal end 25. The proximal end 21 is coupled to the pump 23 where it is adapted to receive water under pressure. The distal end 25 of the delivery system 18 expels the water pressurized in a spray 25 having a predetermined spray configuration.
- [0030] The power washer in this case is merely representative of several types of fluid spray apparatus 10 which provide a fluid under pressure for various purposes. The fluid, which may either be a fluid or a gas, is commonly pressurized for delivery to a predetermined location. The power washer of the type illustrated in Figure 1 is commonly used to provide water under pressure for cleaning sidewalks, driveways, building siding, and other surfaces. Depending on

the surface being treated and the desired pressure, the spray 25 can be provided with different configurations in the manner described in greater detail below.

[0031] In the illustrated embodiment, the delivery system 18 includes a flexible hose 27 which is coupled to the pump 12 on the cart 16. A distal end 30 of the hose 27 is typically coupled to a wand 32 which is held by a user 34. The wand 32 in this embodiment includes a handle 36 and elongate tube 38 which extends through a grip 41 and terminates at a nozzle assembly 43 in this particular embodiment. A nozzle retainer 45 is disposed between the handle 36 and the tube 38. In operation, the delivery system 18 delivers a flow of the fluid under pressure from the pump 12 through the hose 27 and a control valve in the handle 36 and outwardly through the nozzle assembly 43.

[0032] The nozzle retainer 45 is illustrated in greater detail in the side elevation view of Figure 2. In this view it can be seen that the hose 27 can be provided at its distal end 30 with a quick disconnect receiver 47 which is adapted to receive a quick disconnect coupling 50 fixed to the handle 36.

[0033] The handle 36 in this embodiment includes a palm grip 52 and finger guard 54. A valve 56 is operable by a movable lever 58. With this configuration, the flow of water enters the handle through the connector 50 and is directed through the palm grip 52 for control by the valve 56. When the valve is open, the flow of fluid is expelled from the handle 36 at an outlet 61. In this embodiment, the elongate tube 38 extends through the grip 41 and is screwed into the outlet 61 of the handle 36.

[0034] At its distal end, the tube 38 can be provided with the nozzle assembly 43 which in the illustrated embodiment includes a quick disconnect receiver 62 and a plurality of nozzles numbered consecutively with the reference numerals 63 – 70. These nozzles 63 – 70 each have properties for providing the spray 25 (Figure 1) with a different configuration. Thus, the user 34 need only change the nozzle coupled to the receiver 62 in order to change the pattern of the spray 25. It can be appreciated that with this type of system, it is desirable to provide all of the nozzles 63 – 70 in a single ordered arrangement somewhere in proximity to the user 34 near the distal end of the delivery system 18. This is one of the purposes of the nozzle retainer

45 which in the embodiment of Figure 2 is disposed between the handle 36 and the elongate tube 38.

[0035] The nozzles 63 – 70 typically include a short coupling 72 with a cylindrical configuration and an annular recess 74, both adapted for receipt in the quick disconnect receiver 62. The cylindrical coupling 72 will typically extend distally to an orifice 76 which is surrounded by an enlargement 78.

[0036] This retainer 45 is perhaps best illustrated in the front elevation view of Figure 3 and the enlarged side elevation view of Figure 4. From these views it can be seen that a preferred embodiment of the retainer 45 includes a base plate 81 which in this case has a generally planar configuration. The base plate 81 is provided with a mounting aperture 83 and also with a plurality of holes (only one of which is illustrated in Figure 4 and designated by the reference numeral 85). The hole 85 is preferably filled with a rubber grommet 87 having flanges 91 and 93 which extend on opposite sides of the base plate 81. The diameter of the hole 85 and grommet 87 are chosen to facilitate the snug receipt of the cylindrical coupling 72 associated with one of the nozzles, such as the nozzle 63. Since these cylindrical coupling 72 for each of the nozzles 63 – 70 will have the same diameter, holes similar to the hole 85 and grommets similar to the grommet 87 can be provided in an ordered arrangement on the base plate 81 in order to accommodate each of the nozzles 63 – 70 when not in use.

[0037] With reference to Figures 5 and 6, it will be appreciated that this snug relationship can be facilitated by forming the base plate 81 with a thickness which is generally equal to or smaller than the axial width of the annular groove 74 in the coupling 72. This will enable the grommet to spread from its natural state illustrated in Figure 5 to its expanded state illustrated in Figure 6. With the flanges 91 and 93 free to expand radially, only that portion of the grommet 87 which is disposed inwardly of the hole 85 will be retained in its generally fixed diameter. With this structure, the nozzle, such as the nozzle 63, can be pushed into the grommet where it will tend to center with the annular groove 74 in the plane of the base 81. With the nozzle 63 thus retained, the enlargement 78 is spaced sufficiently from the base 81 that it can be easily engaged by the fingers of the user 34 for removal. In the embodiment of Figure 3 the attachment mechanism 82 includes the threaded proximal end of the tube 38 and the threaded orifice 61 associated with the handle 36.

[0038] As noted, the retainer 45 can be disposed between the handle 36 and the elongate tube 38 of the wand 32 by an attachment mechanism 82. In this position, also illustrated in the view of Figure 7, it can be appreciated that the base plate 81 may include portions 87 which are easily accessible and therefore adapted for retention of the nozzles 63 – 70. A portion of the base plate 81 is less accessible due to its proximity with the finger guard 54. This portion is designated by the reference numeral 90 in Figure 7. Preferably, the nozzle retainer 45 is mounted with this portion 90 disposed in closest proximity to the finger guard 54.

[0039] In another embodiment illustrated in Figures 8 and 9, the nozzle retainer 45 is disposed between the palm grip 52 and the coupling 50. In this location, the portion 90 of the base plate 81 is also preferably disposed in proximity to the finger guard 54. In the embodiment of Figure 8, the attachment mechanism 82 includes the threaded distal end of the coupling 50 and the threaded proximal end of the palm grip 52. A view taken along lines 9 – 9 of Figure 8 is illustrated in Figure 9.

[0040] In a further embodiment of the invention illustrated in Figures 10 and 11, the attachment mechanism 82 of the nozzle retainer 45 includes a pivot post 92 which can be attached to the elongate tube 38, for example by a band 94. As best illustrated in the top plan view of Figure 11, the base plate 81 of the nozzle retainer 41 can be formed with all portions 87 accessible. In this case, the holes and grommet, such as the hole 85 and grommet 87 of Figure 4, can be equally angularly spaced around the circumference of the base plate 81. Importantly, the base plate 81 can be made to rotate on the pivot post 92 in order to facilitate access to a particular one of the nozzles 63 – 70.

[0041] In still a further embodiment, the nozzles can be retained directly on the finger guard 54 as illustrated in Figure 12. In this embodiment holes, such as the hole 85, can be filled with an associated grommet, such as the grommet 87, and aligned along the finger guard 54. In the manner previously discussed, the nozzles 63 – 70 can be removably retained on the finger guard 54 in proximity to the distal end 23 of the delivery system 18.

[0042] Another aspect associated with the present invention is associated with the cleaning of the nozzles 63 – 70. As noted, these nozzles will typically have a very small orifice

76 through which the fluid is expelled in a predetermined pattern. Any debris carried in the fluid flow tends to collect in the nozzle 74 upstream of the orifice 76.

[0043] In accordance with the present invention, a cleaning tool is provided with the same general configuration as the nozzles 63 – 70. Thus, a nozzle cleaner 96 may include a cylindrical coupling 98, similar to the coupling 72, and an associated annular recess 101 similar to the recess 74. A circular carrier 103 can be fixed to the cylindrical coupler 98 and molded to retain a cleaning pin 105. Since the pin 105 will have a very small diameter, it may be desirable to provide a guard 107 to cover the pin 105 when it is not in use. The guard 107 can form a dome over the pin 105 and carrier 103, as illustrated in Figure 13. When it is desired to use the nozzle cleaner 96, the guard 107 can be pivoted on a living hinge 110 to expose the pin 105. It may be desirable to retain the guard 107 in this pivoted open position using a detent 112 between the carrier 103 and guard 107.

[0044] By providing the nozzle cleaner 96 with a configuration similar to that of the nozzles 63 – 70, the cleaner 96 can also be releasably held by the nozzle retainer 45.

[0045] From the foregoing description of preferred embodiments it will be apparent that many of the advantages associated with the present invention can be achieved without departing from the spirit and scope of the invention. Therefore, it must be understood that the illustrated embodiments have been set forth only for the purposes of example and should not be taken as limiting the invention. Accordingly, one is cautioned not to limit the concept only to those embodiments disclosed, but rather to determine the scope of the invention only with reference to the following claims.